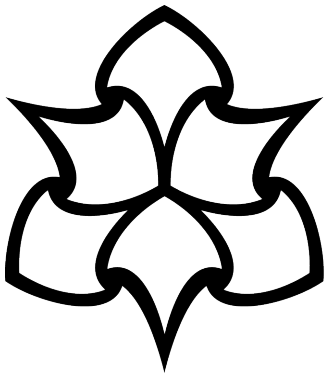

Understanding the Work of Australian Early Childhood Educators Using Time-use Diary Methodology

Abstract

Studies of early childhood educators' perceptions of work intensity and complexity have shown that ensuring a good balance between workload and the time needed to complete the work is critical for work quality, work satisfaction, and staff retention. In this paper we explore the possibilities of time-use data for making visible the diversity and complex patterns of early childhood work. Pen and paper time-use diaries were completed for one full day by 21 educators working in preschool and child care centers, generating a total of 168 hours of data. Diary entries were coded using the *Taxonomy of Early Childhood Work* (Wong et al., 2015) to identify the types of activities performed, the time spent in each activity, and changes in work activities across the day. On average, educators worked an 8-hour day, of which 60% was spent in direct contact with children in intentional teaching, routine care and transition, 'being with' children during play, and providing emotional support. Other activities included organizing the indoor/outdoor play areas, administration, planning/evaluation, professional learning, and staff breaks. The findings demonstrate the benefits of time-use methodology as a means of objectively identifying and quantifying the diversity, complexity and intensity of early childhood educators' work.

Keywords: early childhood educator, early childhood teacher, workload, time-use diary, task analysis

Introduction

Despite a growing appreciation in society of the rapid pace of learning in the early years and the impact that early childhood educators have on the development of young children, and the introduction of government policies to support high quality early childhood education programs, the status of educators who work in preschools and long day care centers falls well below that of their counterparts in schools. In the United States (U. S.), average wages of early childhood professionals are about 53% of wages received by elementary school teachers, and staff turnover rates, estimated at 14% to 15%, are "four times higher than that in elementary schools" (Institute of Medicine & National Research, 2015, p. 471). In Australia, a national survey of 1200 early childhood educators working in long day care centers and preschools found that 20% planned to leave their center within the next 12 months (Irvine, Thorpe, McDonald, Lunn, & Sumsion, 2016). As in the U.S., the most common reason given for leaving was lack of wage parity with colleagues working in other educational contexts, but the educators interviewed by Irvine et al. (2018) also reported a lack of professional recognition for the work educators do, and the nature of the work itself, particularly long hours and challenging work contexts.

The risk to staff retention due to 'challenging work contexts' was further explored by McKinlay, Irvine and Farrell (2018) in interviews with five early childhood teachers. In discussing reasons why they might leave their place of work, these educators spoke about the increased demands of teaching in a work context characterized by large, diverse teams of educators, groups of children whose composition changed from day to day, and an age range that included very young children. They felt these demands were compounded by longer contact hours and a longer working year than their counterparts in schools. The teachers also described concerns about increasing professional expectations, and a lack of time to complete educational documentation.

This and other studies, however, have also shown that the nature of educators' work are reasons for **not** leaving the field (Bloom, 1989; Wagner & French, 2010). The teachers

that McKinlay et al. (2018) interviewed, for example, expressed a "passion for their work" particularly for the opportunities their work gave them "to contribute to children's lifelong learning" (p. 35). They spoke about the freedom they had as early childhood teachers "to exercise their professional judgment when designing and implementing learning experiences" in the long day care context. Similarly, Bullough, Hall-Kenyon, MacKay, and Marshall (2014) describe early childhood teachers as people who "take pleasure in many of the activities of teaching, especially those that produce evidence of student growth and development" (p. 56).

Work satisfaction has also been linked to the nature of early childhood work and the work environment (Bloom, 1988; Bullough et al. , 2014; Phillips, Howes, & Whitebook, 1991; Stremmel, 1991; Stremmel, Bensen, & Powell, 1993). Wagner and French (2010) suggest "the nature of the work itself has to do with the degree to which a teacher's job is intrinsically interesting and satisfies one's need for recognition, innovativeness, and competency building. It includes the amount of autonomy, control, challenge, and variety a teacher experiences on the job, as well as the size of the workload and time allotted to complete it" (p. 155). However, other research has noted that having too little time to complete work tasks reduces educators' ratings of job satisfaction (Kusma, Groneberg, Nienhaus, & Mache, 2014).

Ensuring a good balance between the 'size of the workload and time' is, therefore, a critical issue affecting early childhood educators' work, work satisfaction, and retention. And yet, research on workload and time is almost completely absent from the early childhood literature. While studies of teachers' and principals' time-work balance in elementary and secondary schools have flourished in the past decade (Brante, 2009; Department for Education, 2014; Horng, Kalsik, & Loeb, 2010; McGrath-Champ, Wilson, Stacey, & Fitzgerald, 2018; NSW Department of Education, 2017; Reeves et al., 2010; Vannest, & Parker, 2010; West, 2014; Wilkinson, Ingvarson, Kleinhenz,& Beavis, 2005), there is only

one equivalent study of time-work balance with educators in early childhood settings (Kusma et al., 2010; Kusma, Mache, Quarcoo, Neinhaus, & Groneberg, 2011).

Paradoxically, educators' perceptions and views about time and their work demands are topics of international interest in early childhood research. Authors have applied a variety of qualitative methodologies to the issue, including: interviews to explore perceptions of time and time-use (Nuttal & Thomas, 2016); educator created visual-textual artefacts and research conversations to explore the complexity of educators' work (Cumming, Sumsion, & Wong, 2015, p. 85; Cumming, 2015); ethnographic shadowing with follow-up interviews to study everyday tasks and decisions of educational leaders (Bøe, Hognested & Waniganayake, 2017); and semi-structured focus groups to consider educators' problematization of time (Rose & Whitty, 2010). None of these studies, however, sought to describe or capture the full range of activities that educators engage in during their working day, or how their time is allocated.

In the present study, we elucidate the critical issue of "the size of the workload and time" (Wagner & French, p. 155) in early childhood educators' work through the use of a well-established quantitative methodology, time-use diaries. As described in the following sections, this method enables an intensive study, over a specified time period, of participants' actions ('what' they do) at work, as well as where, when and for how long each of these activities occurs (Bolger, Davis, & Rafaeli, 2003). .

Time-use methodology

Time-use methods have been applied in the social sciences for over 30 years (Bittman, 1992; Bittman & Rice, 2003; Gershuny & Sullivan, 1998), using a variety of formats and data collection tools (Bolger et al., 2003; Frazis & Stewart, 2004). Time-use diaries record the sequence of each action participants perform as 'primary' activities. Diaries

may also record additional actions that are performed at the same time as primary activities. The are referred to as 'secondary' activities or 'multitasking' (Drago & Stewart, 2010).

Time-use methods are felt to offer an effective and relatively unbiased means of recording actual (rather than perceived) work activities and the time spent on each task (NSW Department of Education, 2017). Time-use research in educational contexts has emphasized the objective nature of diary records (Vennest & Parker, 2010; Kusma et al., 2010), particularly when pre-determined coding categories (McGrath-Champ et al., 2018; NSW Department of Education, 2017) or taxonomies (Kusma et al., 2010) are applied. Time-use diary methodology is also highly flexible. Diary records can be completed by the participants themselves (e.g., Reeves et al, 2010) or by another person who shadows (e.g., NSW Department of Education, 2017) or interviews the participant. Diary data can be recorded retrospectively, for example, by the participant at the end of each hour (e.g., Vennest & Parker, 2010) or by an interviewer at the end of the day (e.g., Ryan, Hornbeck, & Frede, 2004), or concurrently as they happen, by continuously recording activities (e.g., Kusma et al., 2010) or recording activities at regular intervals. Self-completed diaries tend to be open-ended and descriptive, allowing participants to record the starting and finishing time of their different activities (e.g., Wilkinson et al., 2005). They may also be formatted to record activities conducted at specific periods of time, such as "before class" or "lunch time" (Reeves et al., 2010, p. 74) or at specific times that are randomly distributed across the day (Brante, 2009). Diaries may be restricted to the participant's working hours (e.g., Brante, 2009; NSW Department of Education, 2017) or extend over a 24 hour period to capture the additional hours teachers and principals work outside their normal work hours (e.g., Department for Education, 2014; Wilkinson et al., 2005).

In this paper, we are particularly interested in exploring the possibilities that time-use diary methodology offers to investigate the full range of activities that early childhood

educators do, in real time, during their working day. Understanding how educators' time is allocated, through the actual recording of tasks, will provide complementary as well as new evidence on perceived work burden and the "tyranny of time" in early childhood settings (Nuttall & Thomas, 2015; Rose & Whitty, 2010).

Time-use studies in early childhood education settings

To date, four studies have applied time-use methodology in early childhood settings. Kusma and colleagues (2010, 2011), working in Germany, used trained observers to collect real-time observations of 11 long day care center educators recording all performed work activities using a pre-determined list of activities on a hand-held PC. Ryan and colleagues, working in the U. S., used retrospective interviews in two studies to record the work activities of teacher consultants and mentors over a 24-hour period (Ryan & Hornbeck, 2004; Ryan et al., 2004). The fourth study, undertaken in Australia, recorded the activities and interactions of children during a full day in their child care center or family day care home using the *Time–Use Diary for Infant-Toddler Childcare* (Harrison, Elwick, Vallotton, & Kappler, 2014). The methods and findings of these studies have informed the present study.

Diary content: What educators do.

Ryan and colleagues (2004a, 2004b) asked open-ended questions about what activities the teacher consultants/mentor did in their professional support roles, how long they spent on each activity, who they were with, and where the activities took place. They coded 20 different types of activities and used factor analysis to identify five categories of work: technical assistance (e.g., direct classroom assistance, meeting with teachers); professional development (e.g., planning / leading workshops); district-related work (e.g., policy, curriculum, paperwork); leadership activities (e.g., attending training); and 'other' which included driving and breaks. Results showed that on average, teacher consultants spent most of their work day providing technical assistance to teachers (42%) or preparing/delivering

workshops for teachers (24%), "activities (that) reflected the intent of their official job description, which was to mentor, support, and provide professional development and curriculum assistance to preschool teachers" (Ryan et al., 2004).

Kusma and colleagues (2010, 2011) drew on the literature and interviews with experienced educators to develop a taxonomy of 38 defined activities grouped under 13 broad categories. Six categories described activities with children (child care, meals, afternoon nap, educational activities, individual contact, playing); seven described other aspects of the educators' work (walking between tasks / excursions; documentation and administrative tasks, contact with parents, cleaning, break, internal communication/ meetings, continuing education). Specially designed software was developed to apply these pre-coded activities to the data collection process. The observer recorded all primary and secondary activities (i.e., occurring sequentially as well as simultaneously) that educators performed during the whole of their work day.

In Kusma et al's study, eleven educators in a day care center were shadowed for 3 days, generating 33 days (250 hours) of data. Analyses showed that the highest percentage of their time (30.1%) was spent in 'care activities', which included child care, meals and afternoon nap, followed by 'playing' (22.3%). Much of educators' time was not 'with children', for example when they were on breaks (5.9%), communicating with other educators or in meetings (7.6%), and 'walking between tasks' (15.8%). Relatively little time was spent in 'educational activities' (10.6%), 'individual child contact' (1.2%), or in 'contact with parents' (1.4%). In interpreting their findings, Kusma et al. (2011) highlighted the contrast between small amount of time educators spent with individual children and their parents, against known benefits of having close connections between educators and families.

Work complexity and intensity.

Work intensification has been identified as a growing concern in early childhood and school education (Brante, 2009; Bullough et al., 2014; Timms, Graham, & Cottrell, 2007). In addressing the complexity and intensity of teachers' work, Brante, (2009) and others have been influenced by literature in the fields of brain development and experimental psychology, in particular, classic experiments on 'task switching' (Rubinstein, Meyer, & Evans, 2001) and 'multitasking' (Rothbart & Posner, 2015). The focus of interest is on subjects' "divided attention in task-switching and dual-task performance" (Courage, Bahktiar, Fitzpatrick, Kenny, & Brandau, 2015, p. 5), which can lead to loss of time and cognitive overload (Rubinstein et al., 2001). Kusma et al. (2011) used the term 'task rotation', which they described as the number of different tasks performed within an hour. Their analysis of educators' time-use records found that, on average, participants performed 24 separate tasks per working hour, with the highest level of task rotation occurring during the first two hours of the day. Their findings also showed that 47.14% of educators' time involved multitasking, performing two or more activities at the same time.

Aim of current study

The aim of the current study was to further explore the potential of time-use diary methodology as a means of understanding and quantifying the diverse and complex nature of early childhood educators' work. Specifically, we sought to collect and analyze time-use diary records to describe four aspects of educators' working day:

1. The number and type of activities educators performed during the day (diversity of work).
2. The time spent in each activity (amount and proportion of time for different work tasks).
3. The changing nature of educators' work within a defined period of time and across the day (task rotation / change of activities).
4. The extent to which multiple demands were made on educators' time (multitasking).

Method

Research context

The study was conducted in center-based early childhood education services, which in Australia are either preschools or long day care / child care centers. Preschool services offer education and care programs for children aged between 3 and 5 years and operate during school hours (9am to 3pm) and school terms. Child care centers offer education and care programs for children aged from 6 weeks to 5 years and are open for a minimum of 8 hours per day (typically from 7:30am to 6pm) and operate for a minimum of 48 weeks per year. All early childhood services, including not-for-profit and for-profit services, are required to meet national standards for quality (ACECQA, 2011). Meeting national standards is a requirement for parent users to receive government subsidies to reduce the cost of their children's education and care.

Recruitment of study sites

Participants were recruited through convenience sampling. Three not-for-profit providers of early childhood services for children under the age of 5 years in Queensland (Qld) and New South Wales (NSW) were approached by the authors. One provider was a stand-alone university-located community-based child care center; the second provider was a large non-government organization that operated a large number of early childhood centers; and the third was a city council which provided preschool and center-based childcare for the local community. The service providers and Directors of five centers gave permission to recruit educators to participate in the study. The consenting research sites comprised a preschool and three child care centers in Sydney, New South Wales (NSW), a child care center in Brisbane, Queensland, and a child care center in a NSW regional town.

Participants

Across the five research sites, 21 teachers/educators consented to participate in the study. The participants were self-selected, in that they were the staff who volunteered to

provide time-use diary data. Given the small number participants per recruitment site and the potential for participants to be identified, individual teachers/educators were not asked to provide any personal information about themselves or the group(s) of children they worked with. Therefore, only summary information is provided on participants.

As a group, the participants were responsible for the education and care of children who ranged in age from 6 weeks to 5 years of age and whose families were diverse in terms of their socio-economic status and ethnic backgrounds. Participants included teachers with a four-year university degree in early childhood education, educators with a two-year diploma of early childhood education and care, and educators with an entry level qualification in early childhood education and care (Certificate III, usually 6 months duration). All 21 participants were female.

Data Collection: Time-use diary

The time-use method used in the study was an open-ended, pen-and-paper time-use diary. A simple one-page template was developed by the authors, modelled on the content recorded by Ryan and colleagues (2004a, 2004b). The template provided space for participants to record: the time that a work activity or activities commenced and ended; a description of the task(s) that were performed; who was present; and where the work took place (see Figure 1). Time periods were open and there was no restriction on the amount of information participants could record. The open-ended nature of the diary also provided an opportunity for educators to record multiple activities that occurred during one diary entry, such as changing a baby's nappy (diaper) while talking with the child's parent.

[INSERT FIGURE 1 ABOUT HERE]

To minimize the burden on participants, diaries were requested for one full working day. Each educator was provided with a paper copy of the time-use diary template and asked to complete the diary by writing entries sequentially from the start to the finish of their

working day. The completed time-use diaries were returned to a member of the research team at a pre-arranged time, or sent via a stamped envelope addressed to the researcher.

Data Analysis

Coding Protocol.

In keeping with existing protocols for analyzing time-use diary data (Kusma et al., 2010; Ryan et al., 2014), we applied a defined set of categories to code each participant's hand-written record. We selected Wong et al.'s (2015) *Taxonomy of Early Childhood Work*, which was developed through a lengthy process involving expert panel discussions, aligning it with Australia's curriculum framework for early childhood, and pilot testing with educators. It provides "an accurate codification system for assessing the daily work tasks, activities and actions of early childhood educators in diverse early years' settings" (p. 85). This coding system overlapped to some extent with the coding framework developed by Kusma et al., but Wong et al.'s taxonomy had more categories (55 vs 38), more descriptive definitions, and more relevance to the Australian context, making it a more appropriate tool for coding the educators' open-ended diaries. Wong et al.'s taxonomy had also been used in an independent study with New Zealand educators (Mitchell & Clarkin-Phillips, 2017), which added further strength to its use in the present study.

Content.

The taxonomy identified ten broad domains of educators' work, and within these, 55 sub-classes of activity: 1) staff personal time (3 sub-classes); 2) intentional teaching with children (10 sub-classes); 3) being with children (3 sub-classes); 4) routine care / transition (6 sub-classes); 5) emotional support (7 sub-classes); 6) family communication (3 sub-classes); 7) organize the room / maintenance / occupational health and safety (7 sub-classes); 8) plan / assess / evaluate (4 sub-classes); 9) administration (6 sub-classes); and 10) professional development and support (6 sub-classes). Detailed descriptions and examples are provided for each domain and sub-class activity. For instance, Domain 2: Intentional teaching, is

defined as “providing teaching and learning experiences that are deliberate, purposeful and thoughtful (with intent) and either planned or spontaneous” and sub-class activity 2.1 ‘problem solving’ is described as “guided discussion, questioning, construction (e.g. working out how to build something or solve a puzzle; guessing game; rules of a board game” (Wong et al., 2015, p.85). The full list of Domains and sub-classes can be seen in Table 3 (Results).

Reliability.

To ensure accuracy and consistency in coding, five of the 21 diaries were independently coded by the first two authors. Mismatches were discussed to clarify discrepancies and reach agreement on interpreting the coding scheme. Inter-rater reliability was calculated as a percentage of the number of exact matches divided by total matches and mismatches for each diary. Once 80% agreement on coding was consistently achieved, the remaining 16 diaries were coded by the second author. Across all 21 diaries, there were no entries that were unable to be coded against the taxonomy.

Individual Diary analysis procedure.

An eight-step process was used to analyze each of the 21 hand-written diaries. These steps directly addressed the Aim of the study by focusing sequentially on four aspects of educators’ work: the number and type of activities; the time spent in each activity; the changing nature of educators’ work (task rotation); and the extent to which multiple demands were made on educators’ time (multi-tasking).

1. We coded each activity the educator performed from the beginning to the end of the day, at the domain and sub-class level of the taxonomy.
2. We transferred the coded diaries to an individual Daily Score Sheet (see Table 1). For each diary entry, we recorded the start time, the duration in minutes, and the sub-class codes for each activity performed during that time period (see Table 1, Columns 1 to 4). This process was repeated for each diary entry. Summary calculations for the full day recorded

the total number of minutes worked (Column 3, last row). For example, the figures in Table 1 showed that S1's day lasted 460 minutes, or 7.67 hours.

3. For each diary entry, we summed the coded activities to record the number of different activities performed during the time period (Column 5) to provide an estimate of 'task rotation'. Summary calculations for the full day recorded the total number of activities (Column 5, last row). For example, S1's day involved 44 work activities.
4. For each diary entry, we estimated the amount of time spent in each activity, by dividing the duration in minutes by the number of activities performed (Table 1, Column 6 = Column 3 / Column 5). This process was repeated for each diary entry. The approach we took to estimate time per activity is a standard procedure in time-use diary research (Professor Michael Bittman, personal communication, Dec 4, 2015). Although the actual amount of time participants spent in each activity could be higher or lower than the estimated allocation, this approach ensures that the summed total of time spent in different activities equals the time frame reported.
5. For each diary entry, we reviewed the coded activities to identify domains of work (single digit codes) and summed the number of different domains that were performed during that time period (Column 7). We highlighted instances when four or more different domains occurring within a 20 minute period as 'hotspots' in order to flag periods of greater work complexity and intensity. Performing multiple domains of activity was expected to be associated with additional load, involving 'task-switching' (Rubenstein et al., 2001), 'dual-task performance' (Courage et al., 2015) and 'multitasking' (Rothbart & Posner, 2015). For example, S1's fourth entry (7:55am to 8:10am) recorded seven activities across five different domains (3, 6, 4, 2, and 8) that were performed in a period of 15 minutes. Multitasking during this time was confirmed from the following extract from SI's hand-written diary for the beginning of that 15-minute period: "interact with children, talking to

parents, assist children when they go to toilet, assist them applying sun cream, helping them do their own".

6. For each participant, we used the individual Daily Score Sheet to calculate the total amount of time (in minutes) that was spent performing each of the different work activities. This information was recorded on an individual Daily Summary Sheet (see Table 2). For example, figures in the first row for S1 show that across her day she spent 20 minutes in activity 1.1 (scheduled breaks), 42.5 minutes engaged in activity 3.1 (watch /scan /supervise) and 30 minutes in activity 9.3 (staff handover / communication).
7. For each participant, we reviewed the entries for the Daily Summary Sheet to record the number of different work activities that were performed (task rotation). For example, Table 2 entries show that S1 engaged in 18 different types of activities over the day.
8. Finally, we recoded each educator's Daily Score Sheets to identify changes in the domains of activity that were performed on an hour to hour basis. Entries that crossed over into the following hour were allocated to the first hour. For example, the first four entries for S1, shown in Table 1 (7:20, 7:30, 7:40, 7:55), generated a combined record from 7am-8am of two activities in Domain 2, one activity in Domain 3, two activities in Domain 4, one activity in Domain 6, one activity in Domain 8, one activity in Domain 9, and one activity in Domain 10.

[INSERT TABLE 1 AND TABLE 2 ABOUT HERE]

Summarizing the diary data.

The figures extracted from each educator's diary (i.e., Daily Score Sheet x 21 and Daily Summary Sheet x 21) were summarized as follows:

1. We transferred the figures from the 21 Daily Summary Sheets (described in step 6, above) into Excel and calculated the *total time in minutes* and *proportion of the day* that educators, on average, spent in each sub-class and domain of work.

2. Daily Summary Sheets records were summed to estimate *task rotation* or the number of different types of activity (sub-classes and domains of work) educators engaged in during their work day (described in step 7 above).
3. We reviewed *episodes of multitasking* or 'hotspots' (described in step 5 above) across the 21 Daily Score Sheets to identify the types of domains that occurred together and when they occurred.
4. We used the recoded hour by hour data (described in step 8 above) to produced visual plots of *the pattern of the day* using line graphs to depict educators' engagement in child-focused activities (Domains 2, 3, 4 and 5), communicating with families (Domain 6), and setting up, cleaning and organizing (Domain 7) from the beginning to the end of the working day. For simplicity, the other four, less frequently occurring domains were not included in the graph.

Results

Early childhood educators' working day

Summary findings presented in Table 3 show that, as a group, educators' diaries provided information on a total of 168.25 hours (10,095 minutes) of work. Together, the 21 diaries generated a data set that extended across an 11-hour time period (7:05am to 6:00pm). The average length of participants' working day was 8.06 hours (484 minutes), ranging from a minimum of 6.44 hours (7:10am to 1:00pm) for a preschool teacher to a maximum of 9.04 hours (7:25am to 4:30pm) for a child care educator. The average length of the working day was slightly longer than the 7.78 hour day reported by Kusma et al. (2011) for German educators.

[INSERT TABLE 3 ABOUT HERE]

Educators' time allocation to their different work activities

Table 3 summarizes the total amount of time (in minutes) that the 21 educators spent in each of the ten domains of work activity and each of the 55 sub-classes of activity, as identified in the *Taxonomy of Early Childhood Work* (Wong, et al., 2015). The average proportion of time that educators spent in each of the domains and sub-classes of activity is also provided. These summary results are presented visually in Figure 2.

The results show that educators spent one-quarter of their time (25.73%) performing routine care tasks with children, including meals and snacks, sleep, toileting and washing, and managing children's transitions (Domain 4). This figure was slightly lower than the 30.1% reported by Kusma et al., (2011) for 'care activities'. Time with children was also described by Domain 2, intentional teaching, Domain 3, 'being with' children, and Domain 5, providing emotional support, which together accounted for 34.67% of participants' work day. Whilst the naming conventions and definitions of these three domains differ from the system used by Kusma et al. (2011), their descriptions of 'educational activities', 'playing', and 'individual contact' suggested that these categories were roughly equivalent to Domains 2, 3, and 5. In Kusma et al.'s (2011) study, these activities together accounted for 34.16% of the German educators' day. This was similar to the 30.1% for Domains 2, 3, and 5 reported in the present study.

[INSERT FIGURE 2 ABOUT HERE]

Results in Table 3 and Figure 2 showed that about one-fifth of educators' time was spent in tasks that were not completed 'with' the children. These activities included: setting up and packing away equipment, cleaning and maintenance (Domain 7) which took up 16.84% of the day; planning, assessing, and documenting children's learning (Domain 8, 3.24%); administrative tasks, including staff handovers (Domain 9, 3.11% of time), and professional learning and support (Domain 10, 1.61%). Importantly, educators reported that

they spent 5.25% of their time in direct communication with families (Domain 6), a substantially higher proportion than the 1.42% reported by Kusma et al. (2011).

The pattern of change in educators' work activities over the day

Our summary analyses of educators' work activities for each hour of the day are presented in Figure 3 for six domains: intentional teaching (light blue line), 'being with' children (orange line); routine care / transitions (grey line); emotional support (yellow line); family communication (dark blue line); and organize the room (green line). The higher (and lower) points of each line show the times of the day when these different activities were more (or less) likely to be performed.

Looking first at the pattern for routine care / transitions, the grey line shows marked peaks during three main periods (9-10am, 11am-12, 2-3pm) which is when responsibilities for helping children with toileting, hand washing and meals / snacks, increased. The pattern for organizing the room (green line) has similar peak times (9-10am, 11am-12, 1-2pm), but not surprisingly is at its highest first thing in the morning (7-8am). Intentional teaching (light blue line) also showed peaks at these same times (9-10am, 11am-12, 1-2pm), being highest between 11am-12pm, which suggests that many educators follow a pattern of group instruction in the period immediately before lunch. In contrast, the time that educators spent 'being with' children (orange line) increased steadily over the morning, dropped off between 12-1pm when children are typically resting or asleep, and increased later in the afternoon. Similarly, educators' provision of emotional support (yellow line) increased through the morning and then remained relatively steady across the day, apart from a dip at 12-1pm. Family communication with families (dark blue line) had two distinct but extended peak periods, from 7-10am and 2-6pm in the afternoon.

[INSERT FIGURE 3 ABOUT HERE]

Work complexity and intensity: Task rotation and multitasking

In addition to illustrating the changing nature of educators' work, Figure 3 also highlights the complexity and intensity of their work; that is, times of the day when educators performed multiple domains of work, combined with high levels of activity. This was most evident from 9-10am, when educators reported engaging in a large number of activities involving four different domains of work activity: routine care (62 activities); 'being with' children (38 activities); organize the room/OH&S (26 activities); intentional teaching (20 activities); combined with other responsibilities for family communication (12 activities); and providing emotional support (9 activities).

Complexity and intensity of educators' work was also indicated by the level of task rotation, which we estimated from the number of different types (sub-classes) and domains of work activity that each educator engaged in across their day or within a one-hour period. Summary figures from educators' diary records showed that the total number of sub-class activities that educators performed in a working day ranged from 36 – 104, with an average of 57.5 activities per day. Based on the length of participants' work day, we estimated that educators performed an average of 7.04 work activities per hour, but this ranged from a low of 3.75 activities per hour to 10.24 activities per hour. The number of different domains of work performed in a day ranged from 13 to 30, with an average for all participants of 20 domains per day. These findings suggest that educators' working day is typified by a high level of task rotation, or changes of work activity. Although difficult to compare, because of the different coding systems and method of data collection, Kusma et al. (2011) drew the same conclusion. Their study showed that, on average, educators performed 24 different tasks per work hour.

A further indicator of work complexity and intensity was multitasking 'hotspots', which we defined as periods in the day when educators performed four or more different domains of work activity within a 20 minute period. Evidence of multitasking 'hotspots' was

found in the diaries of 13 educators, with a total of 20 episodes of multitasking. These records showed a wide variety of combinations of different domains of work activity, but typically multitasking involved 'being with' children (domain 3), routine care / transitions (domain 4), providing emotional support (domain 5), communication with families (domain 6), and organizing the room (domain 7). From this combination of domains, it was not surprising to find that multitasking tended to occur early in the morning and late in the afternoon, when parents were more likely to be in the center, and at meal-times. Kusma et al. (2011) also noted that multitasking was highest in the first hour of the work day.

Discussion and Recommendations for Future Time-Use Research

The research reported in this paper sought to broaden the scope of previous qualitative and survey studies of early childhood educators' perceptions of workload intensification and time pressures (Brante, 2009; Bullough et al., 2014; Timms et al., 2007) by gathering diary records of educators' work activities, as they happened in real time. As far as we are aware, only one other study has used time-use methods to record the daily activities of educators as they go about their work in early childhood education settings (Kusma et al., 2010, 2011).

The present study, conducted in five different early childhood education settings in Australia, provides important complementary evidence for Kusma et al.'s study of educators working in a German non-profit day care center. Despite the different coding systems, findings for educators' distribution of time and work activity across the day were remarkably similar. The length of the average work day was 8.06 hours in Australia and 7.78 hours in Germany. The largest proportion of educators' time in both countries was spent in routine care activities (25.57% Australia; 30.14% Germany) and the second largest proportion was spent playing / being with children (17.45% Australia; 22.33% Germany). In both countries, less of educators' time was allocated to educational / intentional teaching activities (13.58% Australia; 10.62% Germany) and providing individual emotional support (3.87% Australia;

1.21% Germany) for children. Total time with children was 60.47% of the day in the Australian study and 64.30% in the German study. An interesting possibility is that this 4% difference might be explained by educators' break/rest time, which was 4% higher for Australian educators (9.95%) than their German counterparts (5.88%).

Kusma et al. (2011) expressed concern about the small percent of time educators spent with an individual child, suggesting that this may not be "enough time to build a relationship" (p. 4 of 7). However, our data suggested that educators may use other opportunities for one-on-one time to support children's emotional needs and relationship building. Routine care activities, such as feeding and toileting of very young children, are times for making close connections with individual children (Gonzales-Mena & Eyer, 2011), as are playtime and intentional teaching, which can both promote individual contact. Unfortunately, neither the Australian nor the German study provided accurate records of instances when educators were with an individual child. These data were not included in Kusma et al.'s observation protocol, and although educators in the present study were asked to record who they were with (Figure 1), the data provided were inconsistent. Some educators reported the exact number of children they were with (e.g., one child; 11 children aged 2-3 years); others simply referred to the group (e.g., 4-5 year olds). Future time-use studies of early childhood educators should aim to systematically record times when educators are with a single child vs when they are with a group of children.

In both the present and the German study, between 35% to 40% of educators' time was spent in activities that did not directly involve children. In the Australian study, the main non-child-related activity was organizing the room (setting up and packing away, cleaning, maintenance, etc) which accounted for 16.84% of educators' time. An equivalent category, however, was not included in Kusma et al.'s coding framework. The main non-child-related activities in the German study were 'walking between tasks' (15.78%) and internal

communication with other educators (7.54%). On the other hand, communication and contact with families was similarly defined in both studies (5.21% of educators' time in Australia; 1.42% in Germany), as was planning, assessment and documentation, which had equivalent time allocations for both groups of educators (3.24% Australia; 3.37% Germany).

The finding that educators spent only a small amount of the day in documentation (3.11%) Australia; 3.37% Germany) contrasts with reports from educators of time pressures due to excessive paperwork (Bullough et al., 2014; Timms et al., 2007). It may be that the educators had "no time to fulfil these duties on the job" (Kusma et al., 2011, p. 5), but an important limitation in these two studies was that data were only collected during normal working hours. Educators were not asked about any work they completed at home in the evening or on weekends. Interview data from other studies have suggested this is increasingly common, as illustrated by the following quote from Bullough et al. (2014, p. 60): "There's just so much paperwork to do [but] I won't work on it when the kids are in the room. I'll probably be here until ten or eleven tonight". Future research into early childhood educators' work should consider including the work completed outside normal hours, as has been done in some research in schools (Department for Education, 2014).

A further contribution of the present study is the new information it provides to explain complexity demands on educators' work and time. We explored complexity through examining changes in activity domains and sub-classes across the day. The diaries showed that, on average, educators performed 57.5 different sub-classes of work activities in the day, with wide differences: the lowest number of changes was 36 and the highest, 104. Whilst this finding suggests a high degree of demand, it is important to acknowledge that some of these activity changes occurred within the same domain and involved relatively similar types of work (e.g., 3.1 'watch / scan / supervise' and 3.3 'listen / respond to children'). This change can be likened to what Rothbart and Posner (2015) describe as a "simple switch between

highly similar tasks" (p. 47). For this reason, we assessed changes in domains of work, which required "switching to a new goal" (Rothbart & Posner, p. 47) and Brante (2009) refers to as "a more complex form of multitasking" (p. 231). An example from one of the diaries is greeting parents as they arrive with their children (Domain 6: communicating with families) and offering children breakfast (Domain 4: routine care with children). Each domain requires a different type of work demand. On average, 20 different domains of work activity (range =13 to 30) were performed by educators each day.

We also identified multitasking 'hotspots' when educators performed four or more domains of work activity within a 20-minute period. Twenty instances of 'hotspots' were found. Multitasking across multiple domains means that educators need to constantly shift their ways of working and interactions to meet the demands of their diverse 'clients' – which at the same time could include children, families, and colleagues.

The changing and simultaneous demands on educators as they shift from one type of work to another or combine different types of work, makes their work more complicated and intense, and may affect feelings of wellbeing and stress. Rothbart and Posner (2015, p. 47) further point out that "the ability to carry out multitasking effectively can also vary with the time of day and one's level of fatigue". Time-use methods, therefore, are well suited to studying the circumstances of educator stress, which is a growing area of early childhood workforce research that warrants further study (Cumming, 2017).

Limitations of time-use methods

Despite the value of the data provided by educators' time-use diaries, this study has alerted us to some of the limitations of using an open-ended, pen-and-paper format. We noticed that educators' self-reporting of their work activities varied in the degree of detail that was recorded. This suggests that there may have been under-reporting of activities by some educators who may have been too busy to write down everything that they did. There were

also inconsistencies in the start and stop times that participants recorded for each entry in the diary. These could be short and task specific, for example, from 7:05 to 7:15 “open the centre, sign in”, or long and descriptive, for example, setting out all the interaction with children that occurred from 2:30pm to 3:45pm. The longer time periods made it difficult to accurately estimate the duration of each work activity.

The present study showed that whilst data collection was relatively easy for the participating educators, the quality of data was limited, and data analysis was highly labor-intensive. Data quality was compromised in that educators’ records did not distinguish between activities that were completed sequentially and activities that were completed at the same time. This limited the accuracy with which we could quantify the occurrence of multitasking. Our main concern about pen-and paper diaries, however, was time required to code and prepare the data for quantitative analyses.

There were also limitations in the present study due to the size and nature of the sample. With only 21 participants, working different shifts, we were unable to obtain equal numbers of entries very early or very late in the day. We only collected diaries for one working day, which further limited the variation that occurs in work activities from week to week or across different periods of the year. Our participants were also self-selected, which may have led to bias in the reporting of certain activities.

Conclusion

In conclusion, we recommend the use of time-use diary methodology as an appropriate tool for gathering detailed records that accurately describe and quantify the work of early child educators. However, further time-use studies should address the limitations described above to more fully and more easily capture the activities taking place across the whole of educators work day, and possibly including work completed outside of the paid hours. In particular, we recommend that future studies of early childhood education settings

should consider the new technological advances in on-line and smartphone time-use diary methods that have been developed in other fields (Chatzitheochari, 2018). New technologies offer opportunities for computer-based, web-based, and smart-phone methods of data collection that enable data to be readily transferred to data software platforms for analysis (Chatzitheochari et al., 2018), and thus improve data quality and ease of data analysis.

Time-use methodology provides many opportunities for researchers seeking to reveal the diversity, intensity and complexity of early childhood educators' work, including work patterns that may affect job satisfaction, wellbeing and stress. Time-use studies may prove to be an effective tool in achieving greater professional recognition for the work educators do, and through this, greater parity in wages and working conditions with school-based educators.

References

Bittman, M. (1992). *Juggling time: How Australian families use time*. Canberra: Australian Government Publishing Service.

Bittman, M., & Rice, J. M. (2002) The spectre of overwork: An analysis of trends between 1974 and 1997 using Australian Time-Use Diaries. *Labour & Industry: a journal of the social and economic relations of work, 12*(3), 5-25.

Bloom, P. J. (1988). Factors influencing overall job satisfaction and organizational commitment in early childhood work environments. *Journal of Research in Childhood Education, 3*(2), 107–122.

Bloom, P. J. (1989). *Measuring work attitudes: A technical manual for the Early Childhood Work Environment Survey and the Early Childhood Job Satisfaction Survey*, Brandon, VT: Psychology Press

Bøe, M., Hognested, K., & Waniganayake, M. (2017). Qualitative shadowing as a research methodology for exploring early childhood leadership in practice. *Educational Management Administration and Leadership, 45*, 605-620.

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579-616.

Brante, G. (2009). Multitasking and synchronous work: Complexities in teacher work. *Teaching and Teacher Education, 25*, 430-436.

Bullough, R. V., Hall-Kenyon, K. M., MacKay, K. L., & Marshall, E. E. (2014). Head start and the intensification of teaching in early childhood education. *Teaching and Teacher Education, 37*, 55-63.

Chatzitheochari, S., Fisher, K., Gilbert, E., Calderwood, L., Huskinson, T., Cleary, A., & Gershuny, J. (2018). Using new technologies for time diary data collection:

Instrument design and data quality findings from a mixed-mode pilot survey. *Social Indicators Research, 137*, 379-390

Courage, M. L., Bahktiar, A., Fitzpatrick, C., Kenny, S., & Brandau, K. (2015). Growing up multitasking: The costs and benefits for cognitive development. *Developmental Review, 35*, 5-41.

Cumming, T. (2017). Early childhood educators' well-being: An updated review of the literature. *Early Childhood Education Journal, 45*, 583-593

Cumming, T. (2015). Early childhood educators' experiences in their work environments: Shaping (im)possible ways of being an educator? *Complicity: An International Journal of Complexity and Education, 12*(1), 52-66.

Cumming, T., Sumsion, J., & Wong, S. (2014). Early childhood practice and refrains of complexity. *Early Years: An International Research Journal 35* (1), 80-95.

Department for Education (2014). *Teachers' workload diary survey 2013: Research report.* UK. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/285941/DFE-RR316.pdf

Drago, R. W., & Stewart, J. C. (2010). Time-use surveys: Issues in data collection on multitasking. *Monthly Labor Review,* August, 17-31

Frazis, H., & Stewart, J. (2004). What can time-use data tell us about hours of work? *Monthly Labour Review,* December, 3-9.

Gershuny, J., & Sullivan, O. (1998). The sociological uses of time-use diary analysis. *European Sociological Review,* 14(1), 69-85.

Gonzales-Mena, J., & Eyer, W. (2011). *Infants, toddlers, and caregivers: A curriculum of respectful, responsive, relationship-based care and education.* McGraw-Hill Education

Harrison, L. J., Elwick, S., Vallotton, C., & Kappler, G. (2014). Spending time with others:

A Time Use Diary for infant toddler childcare. In L. J. Harrison & J. Sumsion (Eds.), *Lived spaces of infant-toddler education and care* (pp. 59-74). Dordrecht: Springer.

Horng, E. L., Kalsik, D., & Loeb, S. (2010). Principal's time use and school effectiveness. *American Journal of Education, 116,* 491 – 524.

Institute of Medicine & National Research Council (2015). *Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation.* Washington, DC: National Academies Press. Retrieved from http://nap.edu/19401

Irvine, S., Thorpe, K., McDonald, P., Lunn, J., & Sumsion, J. (2016, May). *Money, Love and Identity: Initial findings from the National ECEC Workforce Study*. Summary report from the national ECEC Workforce Development Policy Workshop, Brisbane, Queensland: QUT. Retrieved from https://eprints.qut.edu.au/101622/1/Brief_report_ECEC_Workforce_Development_Policy_Workshop_final.pdf

Kusma, B., Groneberg, D. A., Nienhaus, A., & Mache, S. (2012). Determinants of day are teachers' job satisfaction. *Central European Journal of Public Health, 20* (3), 191-198.

Kusma, B., Mache, S., Quarcoo, D., Neinhaus, A., & Groneberg, D. A. (2011). Educators' working conditions in a day care center on ownership of a non-profit organization. *Journal of Occupational Medicine and Toxicology,* 6 (36).

Kusma, B., Neinhaus, A., Spallek, K., Quarcoo, D., Groneberg, D. A., & Mache, S. (2010). Bidirectional assessment of stress, job satisfaction, and work ability of educators in day care centers: a real-time observation study – the study protocol (BASE). *Journal of Occupational Medicine and Toxicology, 5* (16).

McGrath-Champ, S., Wilson, R., Stacey, M., & Fitzgerald, S. (2018). *Understanding work in schools. The foundation for teaching and learning.* NSW Teachers Foundation. Retrieved from

http://news.nswtf.org.au/application/files/7315/3110/0204/Understanding-Work-In-Schools.pdf

McKinlay, S., Irvine, S., & Farrell, A. (2018) What keeps early childhood teachers working in long day care? Tackling the crisis for Australia's reform agenda in early childhood education and care. *Australasian Journal of Early Childhood, 43*(2), 32-42.

Mitchell, L., & Clarkin-Phillips, J. (2017). *Who cares? Understanding the complexity of the work of the early childhood workforce.* Paper presented at the International Step by Step Association Conference, Ghent, Belgium.

NSW Department of Education (2017). *Principal workload and time use study*. Retrieved from https://education.nsw.gov.au/media/schools-operation/Principal-workload-and-time-use-study-Nov-2017.pdf

Nuttall, J., & Thomas, L (2015). Time and temporality in early childhood educators' work. *European Early Childhood Education Research Journal, 23,* 512-523.

Phillips, D., Howes, C., & Whitebook, M. (1991). Child care as an adult work environment. *Journal of Social Issues*, *47*(2), 49–70.

Reeves, J., McMahon, M., Hulme, M., McQueen, I., Redford, M., McKie, F., & McSeveney, A. (2010). *Evaluating accomplished teaching: Report of a pilot study into means of investigating the impact of accomplished teaching on pupils' learning in the context of the Chartered Teacher Initiative in Scotland. Project Report*. General Teaching Council for Scotland, Edinburgh. Retrieved from http://eprints.gla.ac.uk/47558/

Rose, S., & Whitty, P. (2010). "Where do we find the time to do this?" Struggling against the tyranny of time. *Alberta Journal of Educational Research, 56* (3)

Rothbart, M. K., & Posner, M. I. (2015). The developing brain in a multitasking world. *Developmental Review, 35*, 42-63

Rubinstein, J. S., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of Experimental Psychology, 27* (4), 763-797

Ryan, S., & Hornbeck, A. (2004a). Mentoring for quality improvement: A case study of a mentor teacher in the reform process. *Journal of Research on Childhood Education, 19*(1), 78-95.

Ryan, S., Hornbeck, A., & Frede, E. (2004b). Mentoring for change: A time-use study of teacher consultants in preschool reform. *Early Childhood Research and Practice, 6*(1). Retrieved from: http://ecrp.uiuc.edu/v6n1/ryan.html

Stremmel, A. (1991). Predictors of intention to leave child care work. *Early Childhood Research Quarterly, 6*, 285–298.

Stremmel, A., Benson, M., & Powell, D. (1993). Communication, satisfaction, and emotional exhaustion among child care center staff: Directors, teachers, and assistant teachers. *Early Childhood Research Quarterly, 8*(2), 221–233.

Timms, C., Graham, D., & Cottrell, D. (2007) "I just want to teach": Queensland independent school teachers and their workload, *Journal of Educational Administration, 45*(5), 569-586.

Vannest, K.J., & Parker, R. I. (2010). Measuring time: The stability of special education teacher time use. *The Journal of Special Education, 44*(2), 94 - 106

Wagner, B. D., & French, L. (2010) Motivation, work satisfaction, and teacher change among early childhood teachers. *Journal of Research in Childhood Education, 24*(2), 152-171.

West, K. L., (2014). New measures of teachers' work hours and implications for wage comparisons. *Education, 9* (3), 231 – 263.

Wilkinson, J., Ingvarson, L., Kleinhenz, E.,& Beavis, A. (2005). *Primary teacher work study report.* Melbourne, VIC: Australian Council for Educational Research. Retrieved from http://research.acer.edu.au/workforce/3